

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 1

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis		
CAPITAL COST				
Direct Costs				
Purchased equipment costs				
Hybrid system scope:	\$15,753,000	B&V cost development from vendor quote		
Reagent delivery system				
Wall injectors and multiple nozzle lances				
Automatic injector and lance retract system				
Flue gas temperature, NOx monitors				
Reagent storage tank				
Single layer catalyst SCR system				
Ductwork modifications				
Electrical system upgrades	\$378,000	Actual price from similarly sized unit, escalated to 2007 dollars		
Instrumentation and control system	\$279,000	Actual price from similarly sized unit, escalated to 2007 dollars		
Subtotal capital cost (CC)	<u>\$16,410,000</u>			
Gross Receipt Tax	\$1,015,000	(CC) X	6.2%	
Freight	\$821,000	(CC) X	5.0%	
Total purchased equipment cost (PEC)	<u>\$18,246,000</u>			
Direct installation costs				
Foundation & supports	\$3,649,000	(PEC) X	20.0%	
Handling & erection	\$5,474,000	(PEC) X	30.0%	
Electrical	\$2,737,000	(PEC) X	15.0%	
Piping	\$456,000	(PEC) X	2.5%	
Insulation	\$1,825,000	(PEC) X	10.0%	
Painting	\$182,000	(PEC) X	1.0%	
Demolition	\$1,825,000	(PEC) X	10.0%	
Relocation	\$912,000	(PEC) X	5.0%	
Total direct installation costs (DIC)	<u>\$17,060,000</u>			
Air preheater modifications	\$1,071,000	Scaled from a B&V project based unit size, using 0.7 scale factor		
Balanced draft conversion	\$13,366,000	Adjusted from a B&V balanced draft conversion project based on differences in scope		
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities		
Buildings	\$200,000	Contingency for general site building requirements		
Total direct costs (DC) = (PEC) + (DIC)	<u>\$50,943,000</u>			
Indirect Costs				
Engineering	\$3,566,000	(DC) X	7.0%	
Owner's cost	\$2,547,000	(DC) X	5.0%	
Construction management	\$5,094,000	(DC) X	10.0%	
Construction indirect	\$11,222,000	B&V labor market review		
Start-up and spare parts	\$1,528,000	(DC) X	3.0%	
Performance test	\$509,000	(DC) X	1.0%	
Contingencies	\$10,189,000	(DC) X	20.0%	
Total indirect costs (IC)	<u>\$34,655,000</u>			
Interest During Construction (IDC)	\$3,171,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)
Loss Generation during Outage (GEN)	\$15,667,000	5 weeks and	0.06095 \$/kWh	12 weeks required for BDC, 7 weeks major outage available
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$104,436,000			
ANNUAL COST				
Direct Annual Costs				
Fixed annual costs				
Operating labor	\$125,000	1 FTE and	124,862 \$/year	Estimated manpower level
Maintenance labor & materials	\$1,528,000	(DC) X	3.0%	
Total fixed annual costs	<u>\$1,653,000</u>			
Variable annual costs				
Urea	\$1,703,000	1,089 lb/hr and	420 \$/ton	Engineering estimate
Water	\$1,762,000	252 gpm and	15.67 \$/1,000 gal	Engineering estimate
Catalyst replacement	\$215,000	33 m3 and	6,500 \$/m3	2 yr catalyst replacement rate
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh	Engineering estimate
ID fan power	\$670,000	1,477 kW and	0.06095 \$/kWh	Engineering estimate
Total variable annual costs	<u>\$4,382,000</u>			
Total direct annual costs (DAC)	<u>\$6,035,000</u>			
Indirect Annual Costs				
Cost for capital recovery	\$10,172,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life
Total indirect annual costs (IDAC)	<u>\$10,172,000</u>			
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$16,207,000			

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 2

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis		
CAPITAL COST				
Direct Costs				
Purchased equipment costs				
Hybrid system scope:	\$15,753,000	B&V cost development from vendor quote		
Reagent delivery system				
Wall injectors and multiple nozzle lances				
Automatic injector and lance retract system				
Flue gas temperature, NOx monitors				
Reagent storage tank				
Single layer catalyst SCR system				
Ductwork modifications				
Electrical system upgrades	\$372,000	Actual price from similarly sized unit, escalated to 2007 dollars		
Instrumentation and control system	\$278,000	Actual price from similarly sized unit, escalated to 2007 dollars		
Subtotal capital cost (CC)	<u>\$16,403,000</u>			
Gross Receipt Tax	\$1,015,000	(CC) X	6.2%	
Freight	\$820,000	(CC) X	5.0%	
Total purchased equipment cost (PEC)	<u>\$18,238,000</u>			
Direct installation costs				
Foundation & supports	\$3,648,000	(PEC) X	20.0%	
Handling & erection	\$7,295,000	(PEC) X	40.0%	
Electrical	\$2,736,000	(PEC) X	15.0%	
Piping	\$456,000	(PEC) X	2.5%	
Insulation	\$1,824,000	(PEC) X	10.0%	
Painting	\$182,000	(PEC) X	1.0%	
Demolition	\$1,824,000	(PEC) X	10.0%	
Relocation	\$912,000	(PEC) X	5.0%	
Total direct installation costs (DIC)	<u>\$18,877,000</u>			
Air preheater modifications	\$1,071,000	Scaled from a B&V project based unit size, using 0.7 scale factor		
Balanced draft conversion	\$13,366,000	Adjusted from a B&V balanced draft conversion project based on differences in scope		
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities		
Buildings	\$200,000	Contingency for general site building requirements		
Total direct costs (DC) = (PEC) + (DIC)	<u>\$52,752,000</u>			
Indirect Costs				
Engineering	\$3,693,000	(DC) X	7.0%	
Owner's cost	\$2,638,000	(DC) X	5.0%	
Construction management	\$5,275,000	(DC) X	10.0%	
Construction indirect	\$13,041,000	B&V labor market review		
Start-up and spare parts	\$1,583,000	(DC) X	3.0%	
Performance test	\$528,000	(DC) X	1.0%	
Contingencies	\$10,550,000	(DC) X	20.0%	
Total indirect costs (IC)	<u>\$37,308,000</u>			
Interest During Construction (IDC)	\$3,337,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)
Loss Generation during Outage (GEN)	\$15,231,000	5 weeks and	0.06095 \$/kWh	12 weeks required for BDC, 7 weeks major outage available
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$108,628,000			
ANNUAL COST				
Direct Annual Costs				
Fixed annual costs				
Operating labor	\$125,000	1 FTE and	124,862 \$/year	Estimated manpower level
Maintenance labor & materials	\$1,583,000	(DC) X	3.0%	
Total fixed annual costs	<u>\$1,708,000</u>			
Variable annual costs				
Urea	\$1,703,000	1,089 lb/hr and	420 \$/ton	Engineering estimate
Water	\$1,762,000	252 gpm and	15.67 \$/1,000 gal	Engineering estimate
Catalyst replacement	\$215,000	33 m3 and	6,500 \$/m3	2 yr catalyst replacement rate
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh	Engineering estimate
ID fan power	\$670,000	1,477 kW and	0.06095 \$/kWh	Engineering estimate
Total variable annual costs	<u>\$4,382,000</u>			
Total direct annual costs (DAC)	<u>\$6,090,000</u>			
Indirect Annual Costs				
Cost for capital recovery	\$10,580,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life
Total indirect annual costs (IDAC)	<u>\$10,580,000</u>			
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$16,670,000			

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 3

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis		
CAPITAL COST				
Direct Costs				
Purchased equipment costs				
Hybrid system scope:	\$23,680,000	B&V cost development from vendor quote		
Reagent delivery system				
Wall injectors and multiple nozzle lances				
Automatic injector and lance retract system				
Flue gas temperature, NOx monitors				
Reagent storage tank				
Single layer catalyst SCR system				
Ductwork modifications				
Electrical system upgrades	\$484,000	Actual price from similarly sized unit, escalated to 2007 dollars		
Instrumentation and control system	\$291,000	Actual price from similarly sized unit, escalated to 2007 dollars		
Subtotal capital cost (CC)	<u>\$24,455,000</u>			
Gross Receipt Tax	\$1,513,000	(CC) X	6.2%	
Freight	\$1,223,000	(CC) X	5.0%	
Total purchased equipment cost (PEC)	<u>\$27,191,000</u>			
Direct installation costs				
Foundation & supports	\$5,438,000	(PEC) X	20.0%	
Handling & erection	\$10,876,000	(PEC) X	40.0%	
Electrical	\$4,079,000	(PEC) X	15.0%	
Piping	\$680,000	(PEC) X	2.5%	
Insulation	\$2,719,000	(PEC) X	10.0%	
Painting	\$272,000	(PEC) X	1.0%	
Demolition	\$2,719,000	(PEC) X	10.0%	
Relocation	\$1,360,000	(PEC) X	5.0%	
Total direct installation costs (DIC)	<u>\$28,143,000</u>			
Air preheater modifications	\$8,685,000	Based on a budgetary quote received for the project		
Balanced draft conversion	\$17,122,000	Adjusted from a B&V balanced draft conversion project based on differences in scope		
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities		
Buildings	\$200,000	Contingency for general site building requirements		
Total direct costs (DC) = (PEC) + (DIC)	<u>\$82,341,000</u>			
Indirect Costs				
Engineering	\$5,764,000	(DC) X	7.0%	
Owner's cost	\$4,117,000	(DC) X	5.0%	
Construction management	\$8,234,000	(DC) X	10.0%	
Construction indirect	\$19,442,000	B&V labor market review		
Start-up and spare parts	\$2,470,000	(DC) X	3.0%	
Performance test	\$823,000	(DC) X	1.0%	
Contingencies	\$16,468,000	(DC) X	20.0%	
Total indirect costs (IC)	<u>\$57,318,000</u>			
Interest During Construction (IDC)	\$5,174,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)
Loss Generation during Outage (GEN)	\$23,674,000	5 weeks and	0.06095 \$/kWh	12 weeks required for BDC, 7 weeks major outage available
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$168,507,000			
ANNUAL COST				
Direct Annual Costs				
Fixed annual costs				
Operating labor	\$125,000	1 FTE and	124,862 \$/year	Estimated manpower level
Maintenance labor & materials	\$2,470,000	(DC) X	3.0%	
Total fixed annual costs	<u>\$2,595,000</u>			
Variable annual costs				
Urea	\$2,641,000	1,689 lb/hr and	420 \$/ton	Engineering estimate
Water	\$2,658,000	380 gpm and	15.67 \$/1,000 gal	Engineering estimate
Catalyst replacement	\$270,000	42 m3 and	6,500 \$/m3	2 yr catalyst replacement rate
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh	Engineering estimate
ID fan power	\$997,000	2,197 kW and	0.06095 \$/kWh	Engineering estimate
Total variable annual costs	<u>\$6,598,000</u>			
Total direct annual costs (DAC)	<u>\$9,193,000</u>			
Indirect Annual Costs				
Cost for capital recovery	\$16,413,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life
Total indirect annual costs (IDAC)	<u>\$16,413,000</u>			
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$25,606,000			

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 4

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis		
CAPITAL COST				
Direct Costs				
Purchased equipment costs				
Hybrid system scope:	\$23,680,000	B&V cost development from vendor quote		
Reagent delivery system				
Wall injectors and multiple nozzle lances				
Automatic injector and lance retract system				
Flue gas temperature, NOx monitors				
Reagent storage tank				
Single layer catalyst SCR system				
Ductwork modifications				
Electrical system upgrades	\$484,000	Similar scope to SCR modifications		
Instrumentation and control system	\$291,000	Similar scope to SCR modifications		
Subtotal capital cost (CC)	<u>\$24,455,000</u>			
Gross Receipt Tax	\$1,513,000	(CC) X	6.2%	
Freight	\$1,223,000	(CC) X	5.0%	
Total purchased equipment cost (PEC)	<u>\$27,191,000</u>			
Direct installation costs				
Foundation & supports	\$5,438,000	(PEC) X	20.0%	
Handling & erection	\$8,157,000	(PEC) X	30.0%	
Electrical	\$4,079,000	(PEC) X	15.0%	
Piping	\$680,000	(PEC) X	2.5%	
Insulation	\$2,719,000	(PEC) X	10.0%	
Painting	\$272,000	(PEC) X	1.0%	
Demolition	\$2,719,000	(PEC) X	10.0%	
Relocation	\$1,360,000	(PEC) X	5.0%	
Total direct installation costs (DIC)	<u>\$25,424,000</u>			
Air preheater modifications	\$8,685,000	Based on a budgetary quote received for the project		
Balanced draft conversion	\$17,122,000	Adjusted from a B&V balanced draft conversion project based on differences in scope		
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities		
Buildings	\$200,000	Contingency for general site building requirements		
Total direct costs (DC) = (PEC) + (DIC)	<u>\$79,622,000</u>			
Indirect Costs				
Engineering	\$5,574,000	(DC) X	7.0%	
Owner's cost	\$3,981,000	(DC) X	5.0%	
Construction management	\$7,962,000	(DC) X	10.0%	
Construction indirect	\$16,723,000	B&V labor market review		
Start-up and spare parts	\$2,389,000	(DC) X	3.0%	
Performance test	\$796,000	(DC) X	1.0%	
Contingencies	\$15,924,000	(DC) X	20.0%	
Total indirect costs (IC)	<u>\$53,349,000</u>			
Interest During Construction (IDC)	\$4,927,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)
Loss Generation during Outage (GEN)	\$23,674,000		5 weeks and	0.06095 \$/kWh 12 weeks required for BDC, 7 weeks major outage available
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$161,572,000			
ANNUAL COST				
Direct Annual Costs				
Fixed annual costs				
Operating labor	\$125,000		1 FTE and	124,862 \$/year Estimated manpower level
Maintenance labor & materials	\$2,389,000	(DC) X	3.0%	
Total fixed annual costs	<u>\$2,514,000</u>			
Variable annual costs				
Urea	\$2,641,000	1,689 lb/hr and	420 \$/ton	Engineering estimate
Water	\$2,658,000	380 gpm and	15.67 \$/1,000 gal	Engineering estimate
Catalyst replacement	\$270,000	42 m3 and	6,500 \$/m3	2 yr catalyst replacement rate
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh	Engineering estimate
ID fan power	\$997,000	2,197 kW and	0.06095 \$/kWh	Engineering estimate
Total variable annual costs	<u>\$6,598,000</u>			
Total direct annual costs (DAC)	<u>\$9,112,000</u>			
Indirect Annual Costs				
Cost for capital recovery	\$15,737,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life
Total indirect annual costs (IDAC)	<u>\$15,737,000</u>			
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$24,849,000			